PREVENTION OF TRANSFUSION ACQUIRED CYTOMEGALOVIRUS INFECTION IN NEONATES BY USING FROZEN RECONSTITUTED RED BLOOD CELLS. A PRELIMINARY REPORT

S. Sun, E. Wake, F. Michalski, A. Baldomero, M. Castillo, H. Taylor, J. Oleske

It has been reported that 50 to 60 percent of seronegative patients developed serologic or virologic evidence of CMV infection following extra corporeal perfusion (Embil 1968). Twenty-five percent of exchange transfused neonates were shown to acquire CMV infection weeks after the procedure (Benson 1979). Yeager reported in 1981 that 13.5 percent of newborns became seropositive for CMV after blood transfusion. There is evidence that CMV may be transmitted by leukocytes which harbor the virus in the infected donors blood.

Since it is possible to remove potentially infectious leukocytes from the donnor's blood by the technique of freezing and washing, the purpose of this study is to find out if transfusions of frozen reconstituted RBC would prevent or reduce the incidence of transfusion acquired CMV infection.

Material and method: This prospective study randomly selects neonates requiring elective blood transfusion. Fifty study infants are to receive frozen reconstituted RBC while 50 control infants are to receive ordinary packed RBC. Frozen reconstituted RBC is prepared by following steps: 1. Removal of plasma. 2. Addition of 28% glycerol. 3. Freezing in liquid nitrogen. 4. Thawing in 45°C water bath. 5. Removal of glycerol by manitol solution. 6. Wash in normal saline 3 times. 7. Resuspend in saline. 8. Addition of glucose. Maternal, cord and donnor's blood are tested for CMV complement fixation titers using more potent glycine extracted antigen. The follow-up serologic studies of the infants are carried out at 8 and 16 weeks after the initial transfusion. Urine is cultured for CMV at birth and at the same follow-up schedule. Transfusion acquired CMV infection is defined as seroconversion, persistent rising CMV titer and/or evidence of positive urine culture after transfusions.

Result: So far 71 mother infant pairs have been studied up to 8 to 16 weeks after initial transfusions. Fifty-six percent of mothers and 54% of donnors were seropositive (CMV titer >1:8). Eighty-seven percent of infants born to seropositive mothers were also scropositive. Twenty-nine infants received frozen reconstituted blood transfusions and 7 were transfused with regular blood with negative CMV titers. None of these 36 infants had evidence of CMV infection at 8 and 16 weeks follow-up. While nine of 35

infants who have received regular blood with positive CMV titer showed seroconversion or rising titers at 8 and 16 weeks after transfusion. (Table I) This difference is statistically significant at the p value of less than 0.01 (X^2=6.68).

Comparison of 9 infected and 26 non-infected infants who received regular RBC with CMV positive titers revealed no difference in the number of positive donors, volume of blood with positive titers, and total volume transfused. There was, however, a significant difference (p <0.02) in the donor's CMV titers of the two groups (Table II) Those who were not infected were transfused with blood of higher CMV titers than those who acquired infection. This may imply that the higher donor's titer may be protective to the recipient. This study is but half way completed. So far there is some evidence to show that: 1. transfusion with frozen reconsituted RBC may prevent transfusion acquired CMV infection, 2. the presence of a CMV positive titer does not necessarily imply potential infectivity, 3. the higher CMV titer of donor's blood may be protective of CMV infection.

Table I. TRANSFUSION ACQUIRED CMV INFECTION

Donor's Blood	Donor's CMV Titer	No. Pts.	Post Transfusion CMV Infection (%)
Frozen RBC	0	29	0 (0)
Regular RBC	-	7	0 (0)
Regular RBC	+	35	9 (23)p<0.01

Table II. COMPARISON OF INFECTED VS NON-INFECTED INFANTS

	CMV Infected	Non-CMV infected	P*
No.	9	26	
Number Transfusions	5.4±3.6	9.0±6.0	<0.05
No CMV(+) Donor's Volume(ml)	2.1±1.5	2.3±1.3	NS
CMV(+) Blood Tot Vol (ml)	33±18	34±19	NS
Transfused No CMV	103±54	144±119	NS
Titer >1:32(%)	2/8(25%)	17/22(77%)	<0.02**

*Student T test
**X^2 Test

Address: S. Sun, MD Associate Professor of Pediatrics, UMD-New Jersey Medical School, Children's Hospital of New Jersey, 15 South 9th Street, Newark, New Jersey 07107. USA